THE WARRIOR

U.S. Army Soldier Systems Center | Natick, Massachusetts | November-December 2001

Battlefield health sensors

See Page 6

Contents

Cover photo: A Marine at the Marine Corps Infantry Officer Course prepares for training equipped with physiological status monitoring equipment. (Courtesy photo)

THE WARRIOR
U.S. Army Soldier Systems Center

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Working hard in trying times

I am sure that many of us in the Research, Development and Acquisition (RDA) Enterprise were affected either directly or indirectly by the tragic events on Sept 11. My thoughts and prayers go out to the families and friends of those who were lost.

As we begin the war on terrorism, I am once again reminded how important the mission of the RDA Enterprise is.

Our work in areas such as food, clothing, airdrop, shelters, soldier support equipment and chemical/biological protection is helping to keep our Soldiers safe and to sustain them and their equipment.

These items impact our Soldiers every single day. Our Soldiers rely on RDA-developed food and equipment to carry out their missions, so it's important that we continue to work hard.

You also see our expertise used in various ways. Our expertise in the food area helped the Defense Supply Center-Philadelphia with creating the humanitarian ration and our experience with airdrop assisted in the delivery of those rations.

Our operational pace has picked up and probably will continue. I am proud of the way our work force is handling themselves as professionals even during these trying times.

They are giving 100 percent to supporting our great Soldiers. They have a tireless dedication to supplying soldiers in the field with items that improve the efficiency of their work and the quality of their lives.

Col. (P) James L. Kennon

At our various sites, we anticipate, as all government facilities, being in a state of heightened security for the near term.

We ask for your patience and understanding. Please recognize that the measures being taken are for the protection of our visitors and employees. Your safety is of utmost concern.

On a different note, Veterans Day is fast approaching.

This day is a time when our nation pauses to salute all those who have served and those who continue to serve in uniform.

This Nov. 11 will be different from ones past. Our country has a fresh appreciation for those who serve in uniform. Our nation has turned to our military as the symbolic, but also very real, source of national strength.

American servicemen and women have always been the first on the scene, the first willing to make the ultimate sacrifice to preserve freedom everywhere.

Our servicemen and women have always offered and continue to offer the greatest gift anyone can offer: themselves. They protect our liberty with their blood, sweat, toil and tears. They protect our liberty by putting their very lives on the line.

Veterans Day does more than set aside one day to honor our proud veterans.

Hopefully, the impact of this annual tradition helps extend the spirit of honor and gratitude throughout the year.

The holiday season is also coming upon us quickly. As we approach Thanksgiving, remember to give thanks for our freedom. We are blessed to live in this country that was founded on the ideals of democracy and independence. Although this holiday season may be a more subdued time, keep in mind that it is a time to spend time with loved ones and to participate in our country's many diverse holiday traditions.

As we return to the hustle and bustle of everyday life, please take a moment to think of our Soldiers who are working so hard to ensure our freedom.

One of the blessings that those of us in the RDA Enterprise enjoy is working together toward the common goal of making life better for our Soldiers, many of whom will spend this holiday season far from home and their families.

There is so much we can learn from the selfless giving of these young men and women, whose year-round sacrifices make our nation, and indeed the world, a better place.

Our enterprise, our command, our Army and our nation came together in a show of remarkable patriotism since Sept. 11. In fact, I heard stories of veterans and former government employees calling in to various agencies to see what type of help they could offer.

I hope this devotion to our country will remain and that we all continue to show support for our service members.

May God bless all our Soldiers who do so much to support this great nation, may He bless all of you and may God bless America!

Extreme rations

Special Operations, arctic regions demand different kind of meals

By Curt Biberdorf
Editor

Two special-purpose combat rations developed by the Department of Defense Combat Feeding Program at the U.S. Army Soldier Systems Center (Natick) have merged into a single product called the Meal, Cold Weather/Food Packet, Long Range Patrol (MCW/LRP).

The new item streamlines production and provides greater operational flexibility compared to the Ration, Cold Weather used by soldiers in frigid climates and the Food Packet, Long Range Patrol (LRP) consumed by Special Operations Forces, which shared the same primary components.

The meal/packet expanded the variety to 12 menus from the Ration, Cold Weather's six menus and LRP's eight menus. Besides all-white packaging for cold weather locations and tan wrapping for special operators, the product is nearly identical. Still, the features of the product serve different needs.

Behind enemy lines

The original Food Packet, Long Range Patrol was first issued in 1964 and was popular with soldiers in the Vietnam Conflict, according to Vicki Loveridge, food technologist and project officer for the new meal/packet. The LRP was designed for troops in operations without resupply for up to 10 days issued at one or two packets for each soldier per day.

Each packet contained about 1,100 calories consisting of a precooked, freeze-dehydrated entrée in a reconstitution package as the main component, candy, cereal or fruitcake bar, coffee, cream, sugar, toilet paper, matches and a plastic spoon. Five menus also included a cocoa beverage.

"Freeze-dried foods have a fresher flavor than canned food," Loveridge said. "It's essentially frozen, where the water has been removed. Food tastes better because there are less physical and chemical changes."

Warrior/Underhill

A complete Meal, Cold Weather/Food Packet, Long Range Patrol provides about 1,500 calories.

Freeze-dried food can be eaten as is or rehydrated with hot or cold water. It's resistant to storage damage, and with vacuum packing, the entrees have a shelf life as long as 20 years, according to Loveridge. The new MCW/LRP meets or exceeds the military's shelf life standards of three years at 80 degrees F or six months at 100 degrees F. The process also makes the food lighter and easier to carry.

"Food is one of the things soldiers will discard to save weight and space," she said. "They'd rather carry more ammunition."

By 1983, the Combat Feeding Program created the Food Packet, Assault for the Marine Corps that was never fielded but became useful in developing the Ration, Cold Weather.

Marines wanted a lightweight, high-density food packet issued one per day for each Marine on missions without resupply. Prototypes consisted of a variety of dehydrated and compressed bars that totaled about 1,500 calories. Although it had been approved for purchase, the Food Packet, Assault was too expensive.

Warrior/Underhill

An Army Ranger eats a LRP freezed-dried entree.

The LRP reserves had dwindled during the 1980s, but there was still a demand for a restricted-calorie product to sustain troops during initial assault, special operations and long-range reconnaissance missions.

By 1994, a new LRP ration was introduced. The newest entree package eliminates the old rehydration pouch placed inside an aluminum foil and polyester barrier pack. Soldiers can pour water directly into the brick-shaped pouch holding the food.

The new MCW/LRP weighs 1 pound compared to the Meal, Ready-to-Eat's (MRE) 1 1/2 pounds, and it's compatible with the MRE production.

"It's designed so you can have a good meal without extra weight and bulk," Loveridge said. "You're getting 8 ounces of entrée with the MRE, but a rehydrated LRP provides 16 ounces of food. Special Forces like that because they feel full at least once a day."

That's important because one packet of the new LRP contains 1,540 calories and is intended to give the special operator his food each day for up to 10 days. A study in 1992 conducted with Rangers by the U.S. Army Research Institute of Environmental Medicine, an installation partner at Natick, concluded that the extra calories provided by a LRP ration over a 1,200-calorie MRE can make a critical difference in physical performance and immune function.

"In addition we've learned that they're not nutrient-deficient under these extreme training conditions. They're calorie-deficient," said Loveridge. "They want something lightweight and nutritionally-balanced, and this meets those demands."

Cold calories

Marines who deployed to Norway on NATO training missions faced several problems with the MRE. The entrée pouches, then not designed to withstand freezing and thawing, leaked.

Furthermore, Loveridge said Marines who ate the cold meals experienced hypothermia and dehydration. A different ration was needed.

The prototype Arctic Ration was first designed in 1981 to provide Marines with a lightweight, compact and high-caloric meal for assault, reconnaissance and other non-resupply missions in frigid weather. Another early prototype consisted of three packages.

The main meal pack contained two packages of freeze-dried entrée bars, oatmeal, two plastic spoons and an accessory packet. The other two packages were for a drink or soup, and snacks. The entire ration provided a minimum of 4,500 calories.

The Arctic Ration eventually became the Ration, Cold Weather and is used by the Marine Corps in NATO exercises and Army units in cold climates, such as Fort Drum, N.Y. and Alaska.

Freeze-drying's major advantage besides low weight is low-moisture (2.5 percent compared to the MRE's 40-80 percent) that practically eliminates any chance of it freezing. Other important features of the ration are reduced sodium and protein levels because studies indicated that lowering them reduces the body's need for water. If all the components are hydrated, 90 ounces of water is consumed.

"This gives (troops) a point to start with in water discipline," Loveridge said. "You still need to drink extra water in cold climates. We want to encourage water and calorie consumption, giving them ready-to-eat foods so they can eat on-the-move and rehydratables to maintain water balance."

The Ration, Cold Weather contains a day's ration in two bags weighing 2 3/4 pounds. Troops in cold regions will now be issued three packs of the new Meal, Cold Weather, but its packaging is useful in situations where only one meal is desired, which gives units feeding flexibility, according to Loveridge.

Since it would take four MREs to get 4,500 calories, the MCW is still significantly smaller and lighter.

Customers have been pleased with the results. A Navy master chief at the Naval Special Warfare Detachment in Kodiak, Alaska, wrote Loveridge in June to praise the new MCW.

He said that in 21 years of service it was the best field ration he has used and that he looks forward to giving them to the troops.

Loveridge said future changes to the Meal, Cold Weather/Food Packet, Long Range Patrol may include switching to a single pale-green color for easier procurement, standard use of a peel-open seal for the entrée, and replacement of peanut brittle bar and granola bar with products that have a longer shelf life.

Warrior/Underhill

The Meal, Cold Weather/Food Packet, Long Range Patrol is packaged in tan for Special Operations and white for cold regions. The new product streamlines production and provides greater operational flexibility.

Maximizing performance while protecting the health of future soldiers and Marines on the battlefield is the idea behind...

Warfighter Physiological Status Monitoring

By Col. John Obusek

The U.S. Army Research Institute of Environmental Medicine (USARIEM), an installation partner of the U.S. Army Soldier Systems Center (Natick) and subordinate laboratory of the U.S. Army Medical Research and Materiel Command (USAMRMC), is leading the effort to develop technologies to monitor the physiological status of U.S. warfighters during military operations and training through the Warfighter Physiological Status Monitoring Program (WPSM).

The goal of the WPSM effort is to provide future operational (field) commanders with important information regarding the current and predicted physiological state of their soldiers or Marines in order to guarantee their warfighters are operating at peak performance.

Armed with this type of information, commanders will be much better equipped to assess risk to their forces, plan operations, and tailor logistic support for rations and water.

Using an "Integrated Research Team," the USAMRMC is leading research and development efforts to produce individual monitoring systems that will provide critical information to commanders.

USARIEM, Walter Reed Army Institute of Research, the U.S. Army Aeromedical Research Laboratory, and the Natick Soldier Center are key elements of the research team developing WPSM technologies. These and other team members from government research agencies, academic institutions, and private industry ensure a broad-based research approach.

In addition, representatives from the user and acquisition communities guarantee that WPSM development efforts will satisfy the user's anticipated operational requirements and mesh with other soldier systems under development.

WPSM addresses the medical aspects of the next generation combat uniform being developed at Natick and will ultimately consist of a configurable array of miniaturized, wireless sensors distributed around the warfighter's body.

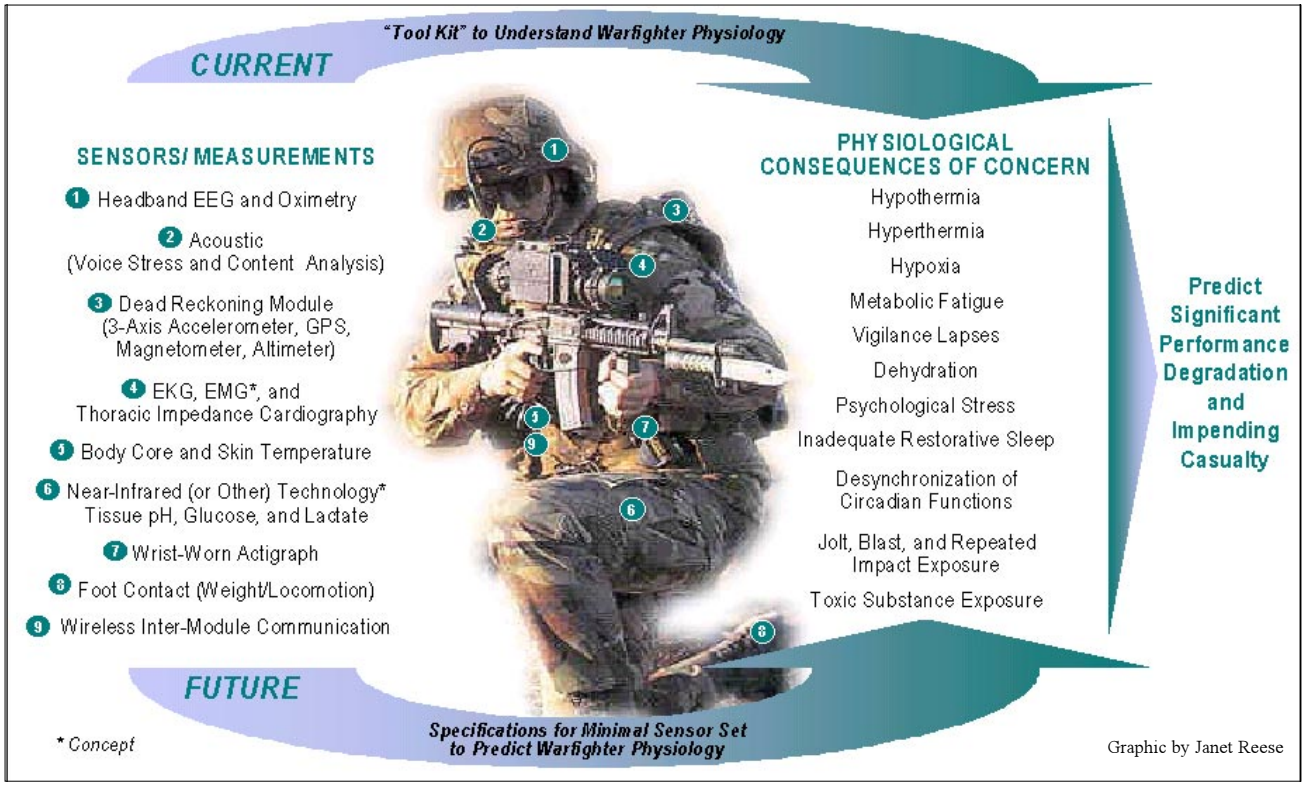
The current experimental WPSM prototype includes sensors for heart rate, metabolic energy cost of walking (marching), core and skin temperatures, and activity/inactivity. A dead reckoning/Global Positioning Satellite (GPS) module provides geolocation.

Sensor data will be transmitted to a central hub—a prototype version is the size of a pager and worn on the belt—using a low-power, wireless, Personal Area Network (PAN). Data from the current suite of sensors provide information on energy expenditure, physiological stress and alertness levels of the warfighter.

The sensors will operate under their own power for several weeks at a time and be low-cost, disposable and transparent to the user. Time-synchronized data from the sensors will be sent via a wireless PAN to the warfighter's digital fighting system. Once received, the aggregated data may then be stored

Courtesy photo

A commercial GPS antenna is attached on a Marine to provide geolocation during a study with Marine infantry officers.



or passed to the individual warfighter's digital fighting system, command communication networks and, in the future, the Internet.

The PAN technology is expected to have dual-use applications in the health care industry. WPSM maximizes the use of intelligent sensors that contain embedded microprocessors. These sensors preprocess biological signals into useful information before transmission. For example, heart rate data are extracted by an onboard microprocessor from continuous electrocardiogram (ECG) data obtained by the sensor. Usually, the extracted heart rate data provide sufficient physiological status information, and the remainder of the ECG signal is discarded, thus reducing the volume of data for transmission and minimizing bandwidth requirements.

Planned bi-directional sensor communication will allow sensor function to be reprogrammed on command or as the result of a specific event. For example, the heart rate sensor will be able to alter its function and provide a full ECG signal to medics in the event of wounding on the battlefield.

Predicting individual performance requires the development of complex algorithms based on understanding the human response to battlefield stressors.

The effects of these stressors, both individually and in combination, are being determined through rigorous investigation under controlled conditions in the laboratory, as well as in field experiments. The relationship of energy expenditure, thermal status, and alertness level to an individual warfighter's predicted performance capacity is being defined.

Strategies to mitigate the negative effects of stress are also being explored.

This basic research is primarily supported by the core science and technology programs of the Operational Medicine Research Area of USAMRMC and is performed under several Army Science and Tech-

Continued on Page 8

Courtesy photo

To keep the monitoring equipment powered during testing, batteries are regularly replaced.

nology Objectives and Defense Technology Objectives. This research is highly leveraged with both academic and government research institutions through cooperative research and development agreements and extramural funding.

The development of WPSM sensors is closely related to the development of a warrior medic capability to perform remote triage on the battlefield.

When a soldier is wounded, WPSM sensors will be able to provide the warrior medic with valuable information regarding critical body functions before arrival at the casualty site.

This information, combined with geolocation information provided by dead reckoning and GPS data, will allow the warrior medic to assess and locate the most critical casualties and to effectively manage their care.

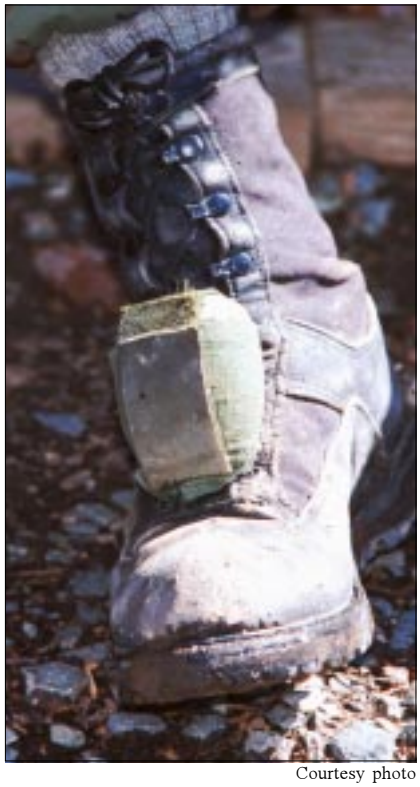
Field tests of prototype WPSM systems have involved studies at Fort Benning, Georgia, in collaboration with the Massachusetts Institute of Technology's Lincoln Laboratory and the Dismounted Battlespace Battle Lab.

In addition, studies were conducted in connection with the Marine Corps Infantry Officer Course at Quantico, Va., and most recently at the Joint Readiness Training Center in Fort Polk, La.

These field studies have demonstrated that experimental WPSM systems can reliably collect physiological data under diverse environmental conditions.

Researchers are also exploring the addition of physiological sensors to assess physical fatigue, total weight, hydration status and blood oxygen levels. These new sensors will augment WPSM's ability to predict critical aspects of performance, especially under extremes of temperature and altitude.

Editor's Note: Col. John Obusek is the commander of USARIEM. Lt. Col. Beau Freund, chairman of the WPSM Integrated Research Team and Dr. Reed Hoyt, chief scientist on the project, contributed to this story. Both are with USARIEM.



Courtesy photo

A high-tech pedometry device attached on a boot measures a warfighter's amount of walking.

Courtesy photo

Dr. Reed Hoyt, research physiologist at USARIEM, assists a Marine at the Marine Corps Infantry Officer Course with his physiological monitoring equipment in a study held during a cold weather field exercise.

Generals belted by specialist

By Anne-Marie Gravel
Contributing Writer

Kimberly Arnold has belted hundreds of Army generals the past 10 years as an inventory management specialist at the U.S. Army Soldier and Biological Chemical Command's Integrated Materiel Management Center-Philadelphia.

Arnold is responsible for maintaining and distributing general officer kits and VIP flags. She's also the person who sizes new brigadier generals for their general officer belt. What she knows is not top secret, but it's also not public knowledge. It's not slanderous information, but for some, if the information became public, it could lead to embarrassment.

"There are some generals who hold in their stomachs, and that is when I pat them on the belly and tell them to let out the air," said Arnold, who measures generals attending the annual one-week Brigadier General Conference. "We used to have the general's aide call in with the general's waist size, but we found that the generals were fibbing about their actual size."

When a colonel is nominated for promotion to brigadier general, she sends him or her an Army-mandated kit that contains an indoor flag, outdoor flag, U.S. flag, poles, cases, and auto plate and flag for their vehicle. Before the annual conference, where they learn all about being a general officer, she makes sure every general has a kit.

"The generals really look forward to getting their kits before the conference," Arnold said. "One general actually said that receiving his kit was like opening a Christmas present from the Army."

The history of the general's belt dates back to World War II. Arnold explained that in 1943, the Army Chief of Staff wanted generals to look dressed up, so he ordered the issue of belts.

The Chief of Staff believed this belt would be used by all general officers when carrying a sidearm, except when going into combat.

The thick black leather belt with an 18-karat gold-plated buckle with an imprint of an eagle was first made in 1944, and added a dressier touch to the khaki shirt and trousers. Now the occasion for wearing it, and the uniform the belt is worn with, are at the discretion of each general officer.

Because too many belts were being returned for being too big or too small, which became costly in shipping expenses, Arnold suggested she attend the conferences to measure the generals in person.

She said some have brought her cookies in the hope of getting an extra belt. A few times she's had generals compare belts and then try to get a different one because the holes were too close or far apart, or because the stitching was loose or uneven.

"Now we have generals worried that their belt is too hard or too soft," she said. "It's funny really. I know it's because they're so excited, and they want everything to be just perfect, so I don't mind."

She's still amused to see the first few generals who are really excited to get their belt and show it off to the others who haven't yet been sized. Some straggle in at the end. They want the belt but don't want to be sized in view of the others because they don't want to reveal their true belt size, said Arnold.

Courtesy photo

Kimberly Arnold sizes a general officer at the annual Brigadier General Conference.

Generals who don't show up are mailed a belt, but it usually needs to be returned because it's the wrong size. She sizes about 100-150 generals per year, with a waist span ranging from 28-44 inches. The most popular sizes are 38-40.

"It's not really as big as it seems because the end number is really their waist size plus two-inches; it gives them room to grow or shrink," she said.

Her dedication to the job was apparent when she flew to the conference last October while recovering from a back injury bad enough to keep her home bedridden on doctor's orders. She knew it was the time when all her work for the year would pay off.

"I couldn't let them down. They look forward to meeting me there," said Arnold, a 17-year government employee. "I didn't want anyone else to do it because people don't do your job like you do it. I guess it's because I really feel honored to be in a position to serve important customers, and to get the job done well."

Besides belts and general's kits, she also takes care of VIP flags for positions such as the president, vice president, secretary of the Army and Army Chief of Staff. The president's and vice president's flags are hand-embroidered and cost approximately $8,000-$11,000. Other VIP flags are now machine-sewn to cut costs. By comparison, general flags cost roughly $100.

Nicknamed "Flag Lady," Arnold said she most enjoys seeing the VIP flags displayed. "I do have to say that it is really great working for and with these men and women. I really feel honored to be in a position to serve such important, high-ranking customers."

Editor's Note: Anne-Marie Gravel is a technical writer with IMMC at Natick.

Religious support simplified

Story and photos by Curt Biberdorf

Ministering to troops in the field will be simplified with the Chaplaincy Logistical Support Package developed by Product Manager-Soldier Support at the U.S. Army Soldier Systems Center (Natick).

The package is a light yet durable container that enables brigade and battalion unit ministry teams to perform their religious support missions for troops in any environment.

"It gets all their stuff to their deployed location and then serves as a workstation and portable altar for the duration of their mission," said Chap. (Lt. Col.) Ben Richardson, Soldier Systems Center chaplain. "Whatever a chaplain needs to take to the field to support his or her ministry is served with this item."

The package consists of a water and dust-resistant olive-drab plastic desk, removable plastic table, folding metal and cloth chair, and a set of washable altar linens.

Four different colored hangings for various seasons in the Christian church year along with the linens are carried in a bag.

The chair and bag carrying the linens fit underneath the removable table, and the table is then attached to the desk for portability. Two handles are on each side for easy maneuverability.

The top desk drawers are lockable, and fit a unit-supplied laptop computer and printer.

Four deep drawers beneath them are designed to carry two chaplain resupply kits along with peripheral devices, manuals, publications, forms, bond paper and related supplies.

Richardson said that in the past, chaplains used anything they could get into their vehicle to bring supplies.

Some used cardboard boxes and others used footlockers. As a minimum, they would normally take one or two resupply kits, containing items such as rosaries, Muslim head coverings, communion wine and wafers, Bibles and other items to support soldiers' faith.

Now chaplains won't have to contend with an unstable cardboard box or heavy footlocker, and they can tailor the load according to their ministry needs.

"The box itself won't fit into the desk, but (the contents) can be split up between the drawers," Richardson said. "For instance, I'm Baptist, so I don't require very much wine for my services, while a Catholic priest uses only wine for his services, so that is all he'll want to take."

Chap. (Lt. Col.) Ben Richardson demonstrates how the Chaplaincy Logistical Support Package table is used as a workstation.

Staff Sgt. Michael Polites unlatches the table from the Chaplaincy Logistical Support Package.

He said the space for the laptop computer is especially helpful when a chaplain has arrived in the field and wants to securely store it.

The package improves transporting the unit ministry team's supplies to the field, but it also functions as a workstation once the team arrives.

Ministry teams can use the desk and table to work on service bulletins, write letters of condolence or conduct other administrative tasks. It's lighter than wooden desks and is weather-resistant.

The accompanying table can be attached to the desk using two legs or stand on four legs independent from the desk.

Telescoping legs lock into four positions at a maximum height of 40 inches and can accommodate taller

The top desk drawers are lockable, and fit a unit-supplied laptop computer and printer. Four drawers beneath them are designed to carry two chaplain resupply kits and administrative supplies.

individuals using the table as a work area. The chair stores flat but unfolds in two steps to provide a reasonably comfortable place to sit with a single piece of cloth on the seat and back.

Besides helping with everyday tasks, the table readily converts into an altar for worship services. By extending the legs to the tallest point and placing the linen and altar items, chaplains can lead a worship service almost anywhere.

"That height is critical for a Catholic priest who stands behind the altar using a liturgy," Richardson said. "For a Baptist, it's not as important. Before CLSP, chaplains had to borrow a field table or conduct services off the hood of a vehicle."

He said a portable altar more than twice the size of the Chaplaincy Logistical Support Package table is available, but its size and single-purpose use are drawbacks.

Twenty-four Chaplaincy Logistical Support Packages were evaluated by unit ministry teams serving with Army, Navy and Marine Corps units in locations around the world. Richardson said users were surprised by the sturdiness of the table and were pleased with it overall.

"I think that Navy chaplains serving with the Marine Corps will be a significant customer because they have limited cargo space when they pack for deployment on ships," Richardson said. "Having a multifunctional item has a great deal of appeal to them."

The package does not replace the new Army field desk and will be available in 2002 for unit purchase through Defense Supply Center-Philadelphia.

The work table easily converts into an altar for worship services.

Cold storage

Refrigeration systems use commercial technology, cut logistics

By Curt Biberdorf
Editor

To eat hot meals made from fresh or frozen ingredients on a deployment, the military needs cooks, kitchens, and just as important, refrigeration.

Four new refrigeration systems programs are in various stages of development at the U.S. Army Soldier Systems Center (Natick) and will help the U.S. military more efficiently store and distribute cook-prepared rations from perishable ingredients much earlier to troops in the field.

The requirements were a result of the lessons learned following Operation Desert Shield and Desert Storm when troops ate packaged rations three times a day for several weeks at a time.

"It's a significant morale booster to get fresh rations in the field," said Paul Mandile, project officer for DoD refrigeration systems. "You can't deliver them without a reliable way to keep the food from spoiling."

Storage of fruits, vegetables, meats and other foods that need cold storage is the main job of refrigeration systems, but they can also preserve medical supplies, such as blood, and if necessary can be used for mortuary affairs.

Refrigeration systems are moving away from military-specific to commercial off-the-shelf models, which couples the latest energy-efficient, non-ozone depleting cooling technologies and global service network for speedy repairs and easy access to spare parts. Commercial brands also offer multi-year warranties for risk-free operation early in their service life.

However, Mandile said insulated containers are still built to military-specifications because the Army, Air Force and Marine Corps have unique service requirements unmet by the commercial market. These new refrigeration systems will increase thermal efficiency and restore the quality lost in current containers that have deteriorated during years of use.

USMC 8x8x10 ISO

Mechanical refrigeration units produced by Thermo-King have already been retrofitted to the Marine Corps 8-by-8-by-10-foot ISO refrigerated container used to store temperature-sensitive cargoes. The next task is replacing the insulated containers.

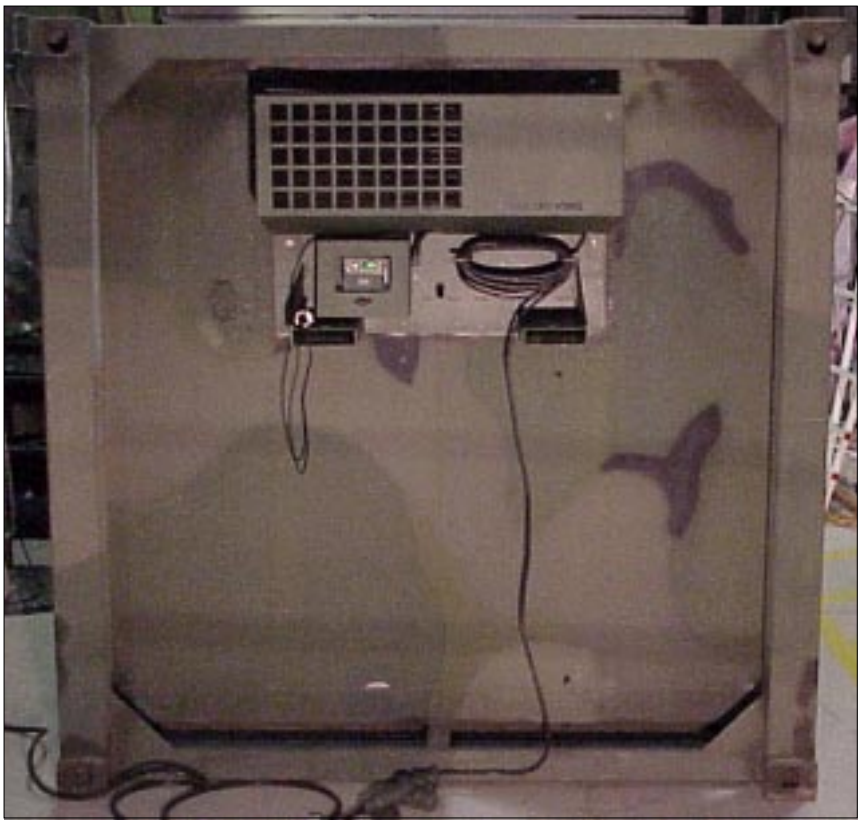
The new electric-driven refrigerators produce 25 percent more BTUs with a 66 percent decrease in power consumption. They are 20 percent lighter and 15 percent more thermally efficient than the units they replaced.

"Many of the current refrigerated containers are more than 20 years old, inefficient, and have reached the end of their useful service life." Mandile said. "One huge bonus is that the Marines received a three-year extended warranty at no additional cost and paid half the initial procurement cost for the new refrigerator."

While removing the old refrigerators from the container, deterioration of the container was easy to see. Wooden frames holding the units in place had dry rot, while rust was widespread in the container's steel frame.

The current container has an aluminum skin on both sides of a steel frame. Mandile said the insulation efficiency had degraded and its performance had decreased.

The new container will still meet ISO standards, but designers are investigating fiberglass composites and aluminums that won't corrode.



Courtesy photo

Because of its increased thermal performance, the new Marine Corps 8x8x10 ISO container can store its cargo at a safe temperature for a longer period without power.

Courtesy photo

Because of the new container's thermal efficiency, a 3,000 BTU commercial refrigerator in the ADR-300 can replace the older 5,000 BTU military-specific model used with the 150-cubic-foot containers.

Advanced materials are expected to provide adequate strength, increase usable volume, cut weight and boost thermal efficiency.

The refrigerator and container are able to cool in transit if there's power available, similar to the commercial trucking industry. Because of its increased thermal performance, the new container will also hold its cargo at a safe temperature for a longer period without power.

"If the refrigerator or generator fails, the product will stay at its temperature for at least 24 hours at an outside temperature of 120 degrees F," Mandile said.

A prototype container is scheduled for delivery by summer 2002 with production scheduled to begin early in 2004.

ADR-300

Instead of placing three 150-cubic-foot containers on a C-130, the Air Force will be able to fly five 300-cubic-foot containers with the new Advanced Design Refrigeration System 300 (ADR-300).

"It's a large transportation footprint reduction," Mandile said. "The Army and Navy have expressed interest, but it's currently an Air Force program."

Since the old 150-cubic-foot refrigerator hangs over the air transport pallet that integrates with the rail system inside a military aircraft, only three of the five pallet positions are occupied. All five-pallet positions can be occupied by the ADR-300.

The back wall of the ADR-300 container will be set back from the edge of the base. It provides a safety aisle required for air cargo transport and a protective bumper to protect the refrigeration unit from damage during handling.

If pallet rails are damaged, removable rails will allow airmen to swap them in the field instead of sending the entire container to a repair facility.

Transport is easier with forklift pockets on all four sides of the pallet, and metal lifting, hoisting, and tie down rings that are used for helicopter and ground transport. Fewer aircraft are needed to deploy them, and the loads can be better balanced.

Dry-rotted wood and insulation that lost its ability to hold proper temperature were other problems with the aging 150-cubic-foot refrigerators.

"Instead of the loose-fill fiberglass insulation that you'd find in your house, we're using new insulation technology where thermal performance will be significantly improved," Mandile said.

New insulation materials will maintain interior temperatures down to -20 degrees F at an ambient temperature of 125 degrees F and will enable walls to be thinner for extra carrying capacity.

Because of the new container's thermal efficiency, a 3,000 BTU commercial refrigerator can replace the older 5,000 BTU military-specific model used with the 150-cubic-foot containers. It slashes energy consumption by 40 percent and weight in half.

Mandile said the Air Force expects to purchase 375 ADR-300s with production expected to begin in the summer of 2002.

ADR-1200

When the requirement calls for mass storage of perishable goods, the Air Force uses the 1,200-cubic-foot prefabricated panel-type refrigerator to perform the job, but deploying it is a chore.

"It's very manpower-intensive to set up and breakdown," Mandile said. "The panels often didn't fit right and are warped or damaged due to rough handling and seal degradation. It allowed heat and moisture to penetrate the panels, causing its internal frame and gaskets to rot."

He added that it also requires more than 2,000 cubic feet of space of shipping containers just to send 1,200 cubic feet of refrigerated space to its destination, which leaves much to improve in transportation

Continued on Page 14

footprint and weight reduction. The old panels suffered from rusty hardware as well, and used a foam insulation that will be replaced with new rugged and thermally-superior materials.

The Advanced Design Refrigeration System 1200 (ADR-1200) replaces wood-lined panels and two 10,000 BTU military-specific refrigerators transported in three shipping containers with a single container and one integrated commercial refrigerator.

The ADR-1200 container system uses two aircraft pallet positions in a cargo plane vs. three for the current 1,200- cubic-foot prefabricated refrigerator.

Although an Air Force-led program, the Army has shown interest, said Mandile. The ADR-1200 is intended primarily for long-term bulk storage of temperature-sensitive products in a base camp.

He said the ADR-1200 could be used as a long-term storage container that would be re-supplied from several of the smaller, more mobile ADR-300s or vice versa.

The ADR-1200 can also be deployed full and operate on-the-move if electrical power is available.

Engineers are investigating various designs to adjust the container volume from 700 cubic feet during transport to 1,200 cubic feet after setup. The first prototype should be ready by September 2003 with production set for 2004.

MTRCS

During Operation Roving Sands, a 1999 training exercise in Texas, the need for a more efficient refrigeration system became apparent.

Two single-temperature 8-by-8-by- 20-foot ISO container refrigeration systems were often sent half-full each with fresh or frozen food supplies for cooks feeding soldiers in the field.

The Army determined they needed a system that could freeze and refrigerate simultaneously to support feeding thousands of soldiers in an Intermediate Brigade Combat Team, and found it with the Multi-Temperature Refrigerated Container System (MTRCS).

MTRCS replaces and improves upon the outdated and worn-out single-temperature refrigeration systems.

A moveable insulated partition divides the container into two separate compartments that can be configured to meet the needs of the mission, eliminating wasted space from half-full, single-use systems. Double side doors on the frozen compartment ease loading and unloading.

Furthermore, using a single system solves the problem of coordinating separate shipments of fresh or frozen foods in theater, Mandile said.

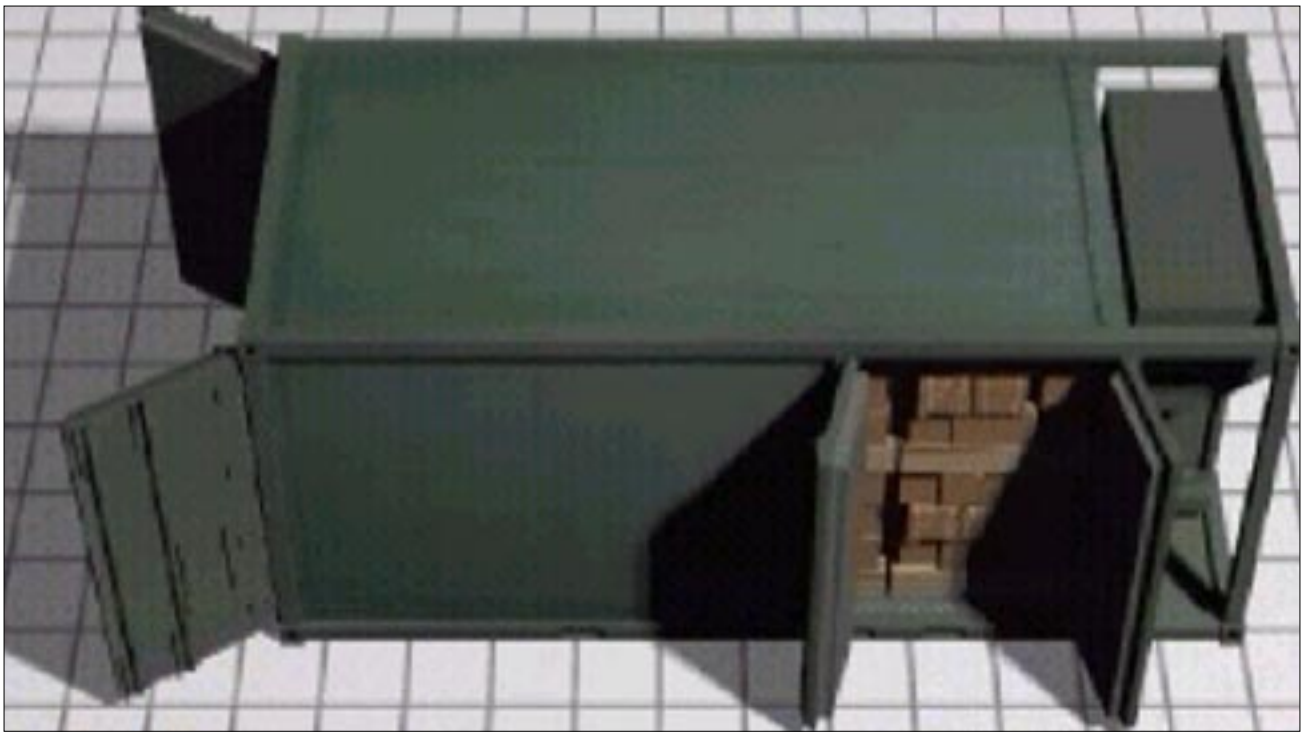
The system's commercially-available diesel engine-driven refrigeration can power itself, or an external electrical power source can operate the unit.

The refrigerator and upgraded insulated container allows an internal temperature range of -20 degrees F to 70 degrees F in ambient conditions as high as 125 degrees F.

"They can eat from the outside in," Mandile said about the unit-configured loads used for cooks to plan meals. "They can have the different rations placed in order and take them out as they work along their planned menu."

Stuffed full, the containers can fit 14 pallets of food and feed 800 soldiers for two days.

A prototype container is scheduled for February 2003 with production set to begin in 2004. More than 300 MTRCS are scheduled for procurement.



Courtesy graphic

The Multi-Temperature Refrigerated Container System can freeze and refrigerate simultaneously to support the feeding of thousands of soldiers in an Intermediate Brigade Combat Team.

LARs

Representatives fix equipment, teach troops in field

By Ron Nolte
Contributing Writer

Part mechanic, technician and logistician, Logistics Assistance Representatives (LAR) provide maintenance and assistance for the U.S. Army Soldier and Biological Chemical Command's (SBCCOM) products.

LARs fix equipment, teach soldiers how to handle tough jobs, and advise units on their equipment. They operate only in the field in peacetime or during a contingency around the world, work alongside soldiers they support, and act as a gateway of information between SBCCOM and the field.

SBCCOM's LARs are part of a larger U.S. Army Materiel Command (AMC) program called the Logistics Assistance Program. The program is AMC's primary field support concept and is part of a shift in command focus toward supporting unit readiness and extending the life of equipment in the field.

Stable readiness

By placing an AMC work force with field units, the major command creates a resource for field commanders and institutes a central point of contact for AMC field-related issues. The Logistics Assistance Program places officers or Department of Army civilians in field offices as the supervisor of major subordinate command LARs to serve as the focal point for the area's AMC issues.

The Logistics Assistance Officer (LAO) is the LAR's first-line supervisor. They are also the senior AMC person at the installation, and become the field commander of any AMC personnel in the area during a training or actual mission.

The LAD chief manages the program through a theater-aligned chain of command. The LAD chief's senior command representatives in Seoul, Korea; Seckenheim, Germany; and Atlanta, Ga., are responsible for the LARs in their geographical areas, and are the SBCCOM liaison with theater-level major commands.

Although difficult to calculate the value added to SBCCOM equipment by LARs, unit readiness rates may be an indicator of LAR value.

Readiness has remained steady while the Army has lost and continues to lose resources every year. As of June 2001, SBCCOM LARs saved the Army more than $6.8 million by identifying items misrouted to the Defense Reutilization and Marketing Office, showing a soldier how to repair an item instead of ordering a new one, reporting Army master data file price challenges and instructing soldiers in correct troubleshooting procedures.

A shift in the field of logistics illustrates how LARs add value to SBCCOM products.

In the past, AMC focused on product development, contracting and production, but changes in the global threat and military composition is redirecting the AMC objective. As the Army transforms itself into a lighter and more mobile force, AMC will retain relevance and expand support to the soldier through recapitalization of assets and improving readiness of military units.

In order to accomplish this goal, AMC must have an effective logistics assistance presence forward with the operational units.

Worldwide network

Much of the commodity command changes are related to modern supply chain management techniques. The streamlining of the supply system is reflected in such initiatives as single stock fund and the wholesale logistics modernization program. Item managers can attest to the rapidly changing state of supply in today's Army.

LARs provide a critical communication channel that serves soldiers in the field, the item manager at Integrated Materiel Management Command and the material development team.

When SBCCOM fields a piece of equipment, the LAR fosters a continued relationship between SBCCOM and Army units in the field. A worldwide customer service network is already in place to add value to SBCCOM equipment.

LARs are the command's personal connection in the field. They build their relationships by working daily with assigned units in their geographic area. When units deploy, LARs deploy with them. In military operations, exercises and field training, LARS travel to where SBCCOM equipment is used. LARs sleep in the same tents, eat the same food, and work hand-in-hand with the soldiers they support for up to six months at a time.

Soldier advocate

They assist soldiers with equipment maintenance and in understanding the interaction with AMC logistics. LARs disseminate technical information on fielded items, general information on upcoming and proposed items, and supply related information from SBCCOM as well as Defense Logistics Agency (DLA).

On the other hand, LARs are the soldiers' advocate back at the command. They provide needed intelligence on equipment, maintenance, usage and supply-related problems.

Besides troubleshooting and repair assistance, LARs track crucial high-priority requisitions, communicate with item managers at SBCCOM and DLA, and troubleshoot supply system failures.

LARs are also essential to SBCCOM's Quality Deficiency Reporting program. They identify equipment problems in the field and help soldiers complete necessary forms.

Editor's Note: Ron Nolte is the LAD chief at SBCCOM's Integrated Materiel Management Center(IMMC).